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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/518,182	Applicant(s) ROUTLEY ET AL.	
	Examiner Jason M. Mandeville	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,7,10,12-14,17,23 and 27-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,7,10,12-14,17,23 and 27-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1, 4, 7, 10, 12-14, 17, 23, 27-28, and 30-33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (hereinafter "Kimura"; US 6,518,962) in view of Shen et al. (hereinafter "Shen"; US 6,414,661) and further in view of Young et al. (hereinafter "Young" US 6,738,031).

3. As pertaining to **Claim 1**, Kimura discloses a display driver (see Fig. 3, Fig. 5, and Fig. 6; *it should be noted that Fig. 3 depicts a configuration of a display driver for the driving of the common electrode, Fig. 5 depicts a configuration for the driving of the opposing electrode, and Fig. 6 depicts a configuration for the driving of the signal line; Kimura discloses an electroluminescent display that can be driven in a manner consistent with any of the above mentioned figures (see Col. 23, Ln. 18-46) such that any of the voltage sources or power supplies can be controlled in a similar manner; while the descriptions provided in this office action relate specifically to Fig. 6 the*

referenced descriptions are equivalent for the other embodiments of the invention shown in Fig. 3 and Fig. 5) for an active matrix electroluminescent display (see Fig. 1; and see Col. 40, Ln. 63-67 through Col. 41, Ln. 1-8), the display comprising a plurality of electroluminescent display elements (10; Col. 20, Ln. 9-25; i.e., pixels containing organic electroluminescent devices) each associated with a display element driver circuit (13, 22c, 21a, 23, 16; in Fig. 6), each display element driver circuit (13, 22c, 21a, 23, 16) including a drive field effect transistor (223; and see Col. 20, Ln. 26-67 through Col. 21, Ln. 1-19) having a gate connection (132) for driving the associated display element (10) in accordance with a voltage (voltage output of 12) on the gate connection (132), (Col. 20, Ln. 9-62; Col. 21, Ln. 29-52), the display driver comprising:

a plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1) each for driving a display elements (224) with an adjustable constant current (i.e., a constant current ID is adjustable by controlling a voltage power supply to the constant current generators; see Col. 20, Ln. 9-67 through Col. 21, Ln. 1-19) determining the voltage on the gate connections (i.e., on the gate connection of (223); also see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-39);

a display element brightness controller (23, 22c, 21a, 16; see Fig. 6) configured to control the plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1) to drive the gate connections (132) to control the electroluminescent output (224) from a display elements (10; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; the electroluminescent output from a display element (10) is a function of the current that flows through the

electroluminescent device (224), which is controlled by the brightness controller circuit formed by (23, 22c, 21a, and 16) controlling the adjustable constant current generators (221, 223, 132, 133)); and

a power controller (23) coupled to a current sensor (16) for controlling an adjustable voltage power supply (see (12) in Fig. 6 or (14) in Fig. 5 or (13) in Fig. 3) to the plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1), the power controller (23) being configured to reduce the power supply voltage (12) in response to the sensed current (see (16)) to a point where a voltage of the adjustable voltage power supply (12) is just sufficient for an adjustable constant current generators (221, 223, 132, 133) with a highest output current to be able to provide a highest gate connection voltage (i.e., on a gate connection of (223)), the highest gate connection voltage (i.e., on a gate connection of (223)) being determined by the highest output current in accordance with a compliance of the adjustable constant current generator (221, 223, 132, 133) with the highest output current (see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51; the power controller (23) is configured to adjust (i.e., increase or reduce) an adjustable voltage power supply (i.e., the output of 22c coupled to (12); see Fig. 6) in order to produce the current Iref through the electroluminescent device (224) in response to a sensed current (see (16)); it is implicit that in order to produce the current Iref through device (224), the power controller (23) is configured to increase or reduce the power supply voltage (12) to a point where the voltage of the adjustable voltage power supply is just sufficient for an adjustable constant current generators (221, 223,

132, 133); further, it is implicit that the highest output current will produce the highest gate connection).

Kimura teaches a current sensor (16) to sense the driving current (ID) through the gate connection drive transistor (223). The sensed current corresponds to the control (gate) voltage of drive transistor (223; see Col. 20, Ln. 41-62). However, Kimura does not explicitly disclose a voltage sensor to sense a said voltage on a said gate connection.

Shen discloses a method and associated system that compensates for long-term variations in the light-emitting efficiency of organic light emitting diodes in an electroluminescent display device (see Fig. 3 and Abstract). In order to produce a constant driver current through an electroluminescent element, Shen utilizes a voltage adjustment that is generated through the use of a correction current applied to a current-to-voltage converter (43; see Abstract and Col. 7, Ln. 1-15). The inventions of Shen and Kimura are in the same field of endeavor. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura with the teachings of Shen in order to convert the current measurement of Kimura into the voltage measurement of Shen to effectively produce a voltage sensor (16) to sense the voltage on the gate connection (132 or gate line of 223; also see Col. 21; Ln. 57-67; Col. 22, Ln. 1-66). As such, it would have been obvious to one of ordinary skill in the art that the power controller (as disclosed by Kimura) is coupled to the voltage sensor (as disclosed by Kimura and Shen).

While it may have been obvious to one of ordinary skill in the art at the time when the invention was made that the power controller of Kimura is configured to increase or reduce the power supply voltage, Kimura does not explicitly state the reduction of the power supply voltage.

Young discloses an active matrix electroluminescent display device (see Fig. 1 and Fig. 2) with light sensing elements (40) in which a photosensitive device, or photodiode, is utilized in order to maintain a constant current through an electroluminescent display device (Col. 1, Ln. 30-67). Young states that in order to maintain a constant current through an electroluminescent element (20), it is possible to sense the voltage or current through the element (20) using the photosensitive device (40; see Col. 4, Ln. 63-67 through Col. 5, Ln. 1-51 and Col. 6, Ln. 31-67 through Col. 7, Ln. 1). Young teaches that the TFT (22) is the driving device for the electroluminescent element (20). Further, Young teaches that during operation of the driving device (22) and obviously during non-operation, "slight variations of the drain voltage do not affect the current flowing through the display element (20)." So, "the voltage on the voltage supply line (30) is therefore not critical to the correct operation of the pixels." Further, it is a goal of Kimura (see Col. 1, Ln. 59-64) to provide "low power consumption." Further, the inventions of Kimura, Shen, and Young are in the same field of endeavor. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura and Shen with the teachings of Young since slightly increasing or reducing the power supply voltage is not

critical to the correct operation of the pixels and decreasing the power supply supports low power consumption. In addition, it would have been obvious that the power controller (23) of Kimura is configured to reduce the power supply voltage (12) in response to the sensed voltage (see (16) and Shen) to a point where a voltage of the adjustable voltage power supply (12) is just sufficient for an adjustable constant current generators (221, 223, 132, 133) with a highest output current to be able to provide a highest gate connection voltage (i.e., on a gate connection of (223)), the highest gate connection voltage (i.e., on a gate connection of (223)) being determined by the highest output current in accordance with a compliance of the adjustable constant current generator (221, 223, 132, 133) with the highest output current.

4. As pertaining to **claim 4**, Kimura teaches that the voltage sensor (16; as disclosed by the combined teachings of Kimura and Shen) is configured to sense the voltage on the gate connection (132, 133) by sensing the voltage on an electrode of the display (see Col. 20, Ln. 41-62; Col. 21; Ln. 57-67; Col. 22, Ln. 1-51).

5. As pertaining to **claim 7**, Kimura also teaches that the display element driver circuit (13, 22c, 21a, 23, 16) includes a photodiode (see Fig. 9, Fig. 15, Fig. 19 in which the current measuring equipment (16) of Fig. 6 has been replaced with a quantity-of-emitted-light measuring equipment (18) of Fig. 9; thus, the display element driver circuit now includes (13, 22c, 21a, 23, and 18; in Fig. 19, an example of a quantity-of-emitted-light measuring device is provided as a PIN diode, which is

equivalent to a photodiode), and wherein a photocurrent through the photodiode (110 in Fig. 19) is determined by the adjustable constant current level to determine the brightness of the display element (224; see Col. 36, Ln. 33-67, Col. 37, Ln. 1-8, Col. 22, Ln. 10-51; the quantity-of-light-measuring device (see Fig. 19 and Fig. 9) or photodiode is provided, along with the current measuring circuit (16") to measure the current for each pixel (10) that flows through the electroluminescent element (224); by using this method to capture a quantity-of-light measurement and an associated current level, the current measuring equipment (16) of Fig. 6 is represented equivalently by the associated quantity-of-light measuring equipment (18) of Fig. 9 and the current measuring circuit (16") of Fig. 19).

6. As pertaining to **claim 10**, Kimura discloses that the highest output current is provided to a display element (223, 224) having a maximum brightness relative to others of the display elements (Col. 22, Ln. 10-67, Col. 23, Ln. 1-11; the highest output current implicitly produces a display element (224) having a maximum brightness relative to the other display elements; also, see Fig. 6 and Fig. 7, as well as Col. 23, Ln. 39-67 and Col. 24, Ln. 1-22).

7. As pertaining to **Claim 12**, Kimura and Young both disclose a display driver wherein the display element driver circuit includes a photodiode (see Fig. 9, Fig. 15, Fig. 19 of Kimura in which the current measuring equipment (16) of Fig. 6 has been replaced with a quantity-of-emitted-light measuring equipment (18) of Fig. 9; thus, the

display element driver circuit now includes (13, 22c, 21a, 23, and 18; in Fig. 19, an example of a quantity-of-emitted-light measuring device is provided as a PIN diode, which is equivalent to a photodiode) to reduce the gate connection voltage (i.e., the voltage on the gate connection of (223)) in accordance with the brightness of the electroluminescent display element (see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and Col. 22, Ln. 10-51 of Kimura in addition to Fig. 9, Fig. 15, and Fig. 19; Col. 36, Ln. 33-67, and Col. 37, Ln. 1-8 of Kimura; and see Col. 1, Ln. 30-67 and Col. 4, Ln. 63-67 through Col. 5, Ln. 1-51 and Col. 6, Ln. 31-67 through Col. 7, Ln. 1 of Young).

8. As pertaining to **Claim 13**, Kimura discloses a display driver wherein the power controller (23) is further configured to both increase and reduce the power supply voltage (see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51; the power controller (23) is configured to adjust (i.e., increase or reduce) an adjustable voltage power supply (i.e., the output of 22c coupled to (12); see Fig. 6) in order to produce the current Iref through the electroluminescent device (224) in response to a sensed current (see (16))). Kimura does not explicitly state that the power controller (23) is configured to increase the power supply voltage when the gate connection voltage (i.e., the voltage on the gate connection of (223)) of the brightest display element has not reduced to less than a threshold value.

However, it would have been obvious to one of ordinary skill in the art at the time when the invention was made that because the power controller (23) of Kimura is configured to increase or reduce the power supply voltage in accordance with the sensed voltage (or current) on the gate connection in order to produce a current Iref through the display element (224), the power controller (23) is configured to increase the power supply voltage when the gate connection voltage (i.e., the voltage on the gate connection of (223)) of the brightest display element has not reduced to less than a threshold value (i.e., the transistor threshold value) after a predetermined interval (i.e., after a driving interval; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and Col. 22, Ln. 10-51 of Kimura in addition to Fig. 9, Fig. 15, and Fig. 19; Col. 36, Ln. 33-67, and Col. 37, Ln. 1-8 of Kimura).

9. As pertaining to **Claim 14**, Kimura discloses (see Fig. 1 and Fig. 6) that the display driver further comprises the adjustable voltage power supply (see (22c and 23); and see Col. 22, Ln. 10-51).

10. As pertaining to **Claim 17**, Kimura discloses a method (see Fig. 3, Fig. 5, and Fig. 6; *it should be noted that Fig. 3 depicts a configuration of a display driver for the driving of the common electrode, Fig. 5 depicts a configuration for the driving of the opposing electrode, and Fig. 6 depicts a configuration for the driving of the signal line; Kimura discloses an electroluminescent display that can be driven in a manner consistent with any of the above mentioned figures (see Col. 23, Ln. 18-46) such that*

any of the voltage sources or power supplies can be controlled in a similar manner; while the descriptions provided in this office action relate specifically to Fig. 6 the referenced descriptions are equivalent for the other embodiments of the invention shown in Fig. 3 and Fig. 5) of operating an active matrix electroluminescent display (see Fig. 1; and see Col. 40, Ln. 63-67 through Col. 41, Ln. 1-8), the display comprising a plurality of pixels (10; Col. 20, Ln. 9-25; i.e., pixels containing organic electroluminescent devices) each with an associated pixel driver (13, 22c, 21a, 23, 16; in Fig. 6), each pixel driver (13, 22c, 21a, 23, 16) including a drive field effect transistor (223; and see Col. 20, Ln. 26-67 through Col. 21, Ln. 1-19) having a gate connection (132) for driving the associated display element (10) in accordance with a voltage (voltage output of 12) on the gate connection (132), (Col. 20, Ln. 9-62; Col. 21, Ln. 29-52), the display having a plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1) each for driving a display element (224) with an adjustable constant current (i.e., a constant current ID is adjustable by controlling a voltage power supply to the constant current generators; see Col. 20, Ln. 9-67 through Col. 21, Ln. 1-19) determining the voltage on the gate connections (i.e., on the gate connection of (223); also see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-39), an adjustable voltage power supply (see (12) in Fig. 6 or (14) in Fig. 5 or (13) in Fig. 3) to the plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51), and a plurality of control lines (131, 132, 133) for setting the brightness of each pixel (10), the method comprising:

controlling (see 23, 22c, 21a, 16; see Fig. 6) the plurality of adjustable constant current generators (221, 223, 132, 133; see Fig. 1) to drive the gate connections (132) to set the brightness of pixels of the display using the control lines (131, 132, 133; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; the electroluminescent output from a display element (10) is a function of the current that flows through the electroluminescent device (224), which is controlled by the brightness controller circuit formed by (23, 22c, 21a, and 16) controlling the adjustable constant current generators (221, 223, 132, 133)); and

reducing (see (23); and (12) in Fig. 6 or (14) in Fig. 5 or (13) in Fig. 3 in conjunction with the adjustable constant current generators (221, 223, 132, 133)) the power supply voltage (12) responsive to monitoring (i.e., monitoring a sensed current; see (16)) to a point where a voltage of the adjustable voltage power supply (12) is just sufficient for an adjustable constant current generators (221, 223, 132, 133) with a highest output current to be able to provide a highest gate connection voltage (i.e., on a gate connection of (223)), the highest gate connection voltage (i.e., on a gate connection of (223)) being determined by the highest output current in accordance with a compliance of the adjustable constant current generator (221, 223, 132, 133) with the highest output current (Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51; the power controller (23) is configured to adjust (i.e., increase or reduce) an adjustable voltage power supply (i.e., the output of 22c coupled to (12); see Fig. 6) in order to produce the current Iref through the electroluminescent device (224) in response to a sensed current (see (16)); it is

implicit that in order to produce the current Iref through device (224), the power controller (23) is configured to increase or reduce the power supply voltage (12) to a point where the voltage of the adjustable voltage power supply is just sufficient for an adjustable constant current generators (221, 223, 132, 133); further, it is implicit that the highest output current will produce the highest gate connection).

Kimura teaches a current sensor (16) to monitor the control lines (131, 132, 133) of the display to sense currents (i.e., the driving currents (ID)) on the gate connections of the drive transistor (223). The sensed current corresponds to the control (gate) voltage of drive transistor (223; see Col. 20, Ln. 41-62). However, Kimura does not explicitly disclose monitoring control lines of the display to sense the voltages on the gate connections.

Shen discloses a method and associated system that compensates for long-term variations in the light-emitting efficiency of organic light emitting diodes in an electroluminescent display device (see Fig. 3 and Abstract). In order to produce a constant driver current through an electroluminescent element, Shen utilizes a voltage adjustment that is generated through the use of a correction current applied to a current-to-voltage converter (43; see Abstract and Col. 7, Ln. 1-15). The inventions of Shen and Kimura are in the same field of endeavor. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura with the teachings of Shen in order to convert the current measurement of Kimura into the voltage measurement of Shen to effectively

produce a voltage sensor (16) to monitor control lines (131, 132, 133) of the display to sense the voltages on the gate connections (132 or gate line of 223; also see Col. 21; Ln. 57-67; Col. 22, Ln. 1-66). As such, it would have been obvious to one of ordinary skill in the art that the power controller (as disclosed by Kimura) is coupled to the voltage sensor (as disclosed by Kimura and Shen).

While it may have been obvious to one of ordinary skill in the art at the time when the invention was made that the method of Kimura includes increasing or reducing the power supply voltage, Kimura does not explicitly state the reduction of the power supply voltage.

Young discloses an active matrix electroluminescent display device (see Fig. 1 and Fig. 2) with light sensing elements (40) in which a photosensitive device, or photodiode, is utilized in order to maintain a constant current through an electroluminescent display device (Col. 1, Ln. 30-67). Young states that in order to maintain a constant current through an electroluminescent element (20), it is possible to sense the voltage or current through the element (20) using the photosensitive device (40; see Col. 4, Ln. 63-67 through Col. 5, Ln. 1-51 and Col. 6, Ln. 31-67 through Col. 7, Ln. 1). Young teaches that the TFT (22) is the driving device for the electroluminescent element (20). Further, Young teaches that during operation of the driving device (22) and obviously during non-operation, "slight variations of the drain voltage do not affect the current flowing through the display element (20)." So, "the voltage on the voltage supply line (30) is therefore not critical to the correct operation of the pixels." Further, it

is a goal of Kimura (see Col. 1, Ln. 59-64) to provide "low power consumption." Further, the inventions of Kimura, Shen, and Young are in the same field of endeavor. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura and Shen with the teachings of Young since slightly increasing or reducing the power supply voltage is not critical to the correct operation of the pixels and decreasing the power supply supports low power consumption. In addition, it would have been obvious that the method of Kimura includes reducing the power supply voltage (12) in response to the monitored voltage (see (16) and Shen) to a point where a voltage of the adjustable voltage power supply (12) is just sufficient for an adjustable constant current generators (221, 223, 132, 133) with a highest output current to be able to provide a highest gate connection voltage (i.e., on a gate connection of (223)), the highest gate connection voltage (i.e., on a gate connection of (223)) being determined by the highest output current in accordance with a compliance of the adjustable constant current generator (221, 223, 132, 133) with the highest output current.

11. Further, as pertaining to **Claim 23,** Kimura discloses that the pixel driver includes a photodiode (see Fig. 9, Fig. 15, Fig. 19 in which the current measuring equipment (16) of Fig. 6 has been replaced with a quantity-of-emitted-light measuring equipment (18) of Fig. 9; thus, the display element driver circuit now includes (13, 22a, 21a, 23, and 18; in Fig. 19, an example of a quantity-of-emitted-light measuring device is provided as a PIN diode; the PIN diode is inherently the equivalent of the photodiode) and wherein a

current through the photodiode is determined by the adjustable constant current (see Col. 36, Ln. 33-67, Col. 37, Ln. 1-8, Col. 22, Ln. 10-51; the quantity-of-light-measuring device (see Fig. 19 and Fig. 9) or photodiode is provided, along with the current measuring circuit (16") to measure the current for each pixel (10) that flows through the photodiode; by using this method to capture a quantity-of-light measurement and an associated current level, the current measuring equipment (16) of Fig. 6 is represented equivalently by the associated quantity-of-light measuring equipment (18) of Fig. 9 and the current measuring circuit (16") of Fig. 19).

12. As pertaining to **Claim 27,** Kimura describes the active matrix display driver configured to operate in accordance the method of claim 17 (see Fig. 1, Fig. 3, Fig. 6, and Fig. 9).

13. As pertaining to **Claim 28,** Kimura teaches the display driver as claimed in claim 1 wherein the electroluminescent display comprises an organic light emitting diode display (see Fig. 1; Col. 21, Ln. 5-10).

14. As pertaining to **Claim 30,** Kimura teaches the display driver as claimed in claim 32 wherein the electroluminescent display comprises an organic light emitting diode display (see Fig. 1; Col. 21, Ln. 5-10).

15. As pertaining to **Claim 31,** Kimura teaches the method as claimed in claim 17 wherein the electroluminescent display comprises an organic light emitting diode display (see Fig. 1; Col. 21, Ln. 5-10).

16. As pertaining to **Claim 32**, Kimura discloses a display driver (see Fig. 3, Fig. 5, and Fig. 6; *it should be noted that Fig. 3 depicts a configuration of a display driver for the driving of the common electrode, Fig. 5 depicts a configuration for the driving of the opposing electrode, and Fig. 6 depicts a configuration for the driving of the signal line; Kimura discloses an electroluminescent display that can be driven in a manner consistent with any of the above mentioned figures (see Col. 23, Ln. 18-46) such that any of the voltage sources or power supplies can be controlled in a similar manner; while the descriptions provided in this office action relate specifically to Fig. 6 the referenced descriptions are equivalent for the other embodiments of the invention shown in Fig. 3 and Fig. 5*) for an active matrix electroluminescent display (see Fig. 1; and see Col. 40, Ln. 63-67 through Col. 41, Ln. 1-8), the display comprising a plurality of electroluminescent display elements (10; Col. 20, Ln. 9-25; i.e., pixels containing organic electroluminescent devices) each associated with a display element driver circuit (13, 22c, 21a, 23, 16; in Fig. 6), each display element driver circuit (13, 22c, 21a, 23, 16) including a drive field effect transistor (223; and see Col. 20, Ln. 26-67 through Col. 21, Ln. 1-19) having a gate connection (132) for driving the associated display element (10) in accordance with a voltage (voltage output of 12) on the gate connection (132), (Col. 20, Ln. 9-62; Col. 21, Ln. 29-52), the display being configured for cyclical

driving (i.e., the display has a defined driving cycle; see Col. 20, Ln. 9-67 through Col. 21, Ln. 1-19), the gate connection voltage (i.e., the voltage on the gate connection of (223)) gradually decaying according to the brightness of the associated electroluminescent display element (224; i.e., the brightness of the display element (224) is determined according to the gate connection voltage, which gradually decays; again, see Col. 20, Ln. 9-67 through Col. 21, Ln. 1-19 in conjunction with (222) of Fig. 1), the display driver comprising:

a display element brightness controller (23, 22c, 21a, 16; see Fig. 6) to cyclically driving the display and configured to provide an output to drive the gate connection (i.e., the gate connection of (223)) to control the electroluminescent output (224) from the display elements (10; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; the display is driven cyclically according to the drive gate connection and the current that flows through the electroluminescent device (224), which is controlled by the brightness controller circuit formed by (23, 22c, 21a, and 16) and (221, 223, 132, 133)); and

a power controller (23) coupled to a current sensor (16) for controlling an adjustable voltage power supply (see (12) in Fig. 6 or (14) in Fig. 5 or (13) in Fig. 3) to the provide an adjustable voltage to the electroluminescent display to power the drive transistors (221, 223) for driving the display elements (10), the power controller (23) being configured to reduce the power supply voltage (12) in response to the sensed current (see (16)) such that the gate connection voltage (i.e., the voltage on the gate connection of (223)) of a brightest display element has decayed sufficiently to switch the

brightest display element off at the end of the driving cycle of the display (again, see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51; the power controller (23) is configured to adjust (i.e., increase or reduce) an adjustable voltage power supply (i.e., the output of 22c coupled to (12); see Fig. 6) in order to produce the current Iref through the electroluminescent device (224) in response to a sensed current (see (16)); it is implicit that in order to produce the current Iref through device (224), the power controller (23) is configured to increase or reduce the power supply voltage (12) to a point where the voltage of the adjustable voltage power supply is just sufficient for an adjustable constant current generators (221, 223, 132, 133)).

Kimura teaches a current sensor (16) to sense the driving current (ID) on the gate connection (223). The sensed current corresponds to the control (gate) voltage of drive transistor (223; see Col. 20, Ln. 41-62). However, Kimura does not explicitly disclose a voltage sensor to sense a said voltage on a said gate connection.

Shen discloses a method and associated system that compensates for long-term variations in the light-emitting efficiency of organic light emitting diodes in an electroluminescent display device (see Fig. 3 and Abstract). In order to produce a constant driver current through an electroluminescent element, Shen utilizes a voltage adjustment that is generated through the use of a correction current applied to a current-to-voltage converter (43; see Abstract and Col. 7, Ln. 1-15). The inventions of Shen and Kimura are in the same field of endeavor. Therefore, it would have been

obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura with the teachings of Shen in order to convert the current measurement of Kimura into the voltage measurement of Shen to effectively produce a voltage sensor (16) to sense the voltage on the gate connection (132 or gate line of 223; also see Col. 21; Ln. 57-67; Col. 22, Ln. 1-66). As such, it would have been obvious to one of ordinary skill in the art that the power controller (as disclosed by Kimura) is coupled to the voltage sensor (as disclosed by Kimura and Shen).

While it may have been obvious to one of ordinary skill in the art at the time when the invention was made that the power controller of Kimura is configured to increase or reduce the power supply voltage, Kimura does not explicitly state the reduction of the power supply voltage.

Young discloses an active matrix electroluminescent display device (see Fig. 1 and Fig. 2) with light sensing elements (40) in which a photosensitive device, or photodiode, is utilized in order to maintain a constant current through an electroluminescent display device (Col. 1, Ln. 30-67). Young states that in order to maintain a constant current through an electroluminescent element (20), it is possible to sense the voltage or current through the element (20) using the photosensitive device (40; see Col. 4, Ln. 63-67 through Col. 5, Ln. 1-51 and Col. 6, Ln. 31-67 through Col. 7, Ln. 1). Young teaches that the TFT (22) is the driving device for the electroluminescent element (20). Further, Young teaches that during operation of the driving device (22) and obviously during non-operation, "slight variations of the drain voltage do not affect

the current flowing through the display element (20)." So, "the voltage on the voltage supply line (30) is therefore not critical to the correct operation of the pixels." Further, it is a goal of Kimura (see Col. 1, Ln. 59-64) to provide "low power consumption." Further, the inventions of Kimura, Shen, and Young are in the same field of endeavor. Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to combine the teachings of Kimura and Shen with the teachings of Young since slightly increasing or reducing the power supply voltage is not critical to the correct operation of the pixels and decreasing the power supply supports low power consumption. In addition, it would have been obvious that the power controller (23) of Kimura is configured to reduce the power supply voltage (12) in response to the sensed voltage (see (16) and Shen) such that the gate connection (223) voltage of a brightest display element (10) has decayed sufficiently to switch the brightest display element (10) off at the end of a driving cycle of the display (again, see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51 of Kimura).

17. As pertaining to **Claim 33**, Kimura discloses that the display driver further comprises the adjustable voltage power supply (see (12) in Fig. 6 or (14) in Fig. 5 or (13) in Fig. 3; and see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51).

Response to Arguments

18. Applicant's arguments filed 31 October 2007 have been fully considered but they are not persuasive. **Claims 1, 4, 7, 10, 12-14, 17, 23, and 27-33** are pending in the application, of which **Claims 1, 4, 7, 10, 12-14, 17, 23, and 30** have been amended and **Claims 32-33** are new. **Claims 2-3, 5-6, 8-9, 11, 15-16, 18-22, and 24-26** have been canceled. The applicant has argued that the references relied upon in the prior office action, namely Kimura (US 6,518,962), Shen (US 6,414,661), and Young (US 6,738,031), do not disclose a current-driven active matrix pixel wherein the brightness is being set by an adjustable constant current. The examiner respectfully disagrees. In fact, Kimura, Shen, and Young all discloses a current-driven active matrix pixel wherein the brightness is being set by an adjustable constant current (see Abstract and Col. 2, Ln. 53-62 of Kimura, see Abstract and Col. 1, Ln. 19-57 of Shen, and see Col. 1, Ln. 18-67 through Col. 2, Ln. 1-12 of Young).

The applicant has further argued that none of the relied upon references discloses a constant current generator. However, the examiner asserts that the use of driving elements (221 and 223) as shown in the display device (see Fig. 1) of Kimura constitute a constant current generator; and further, it is the primary goal of Kimura to provide constant current to a display element through the use of elements (221 and 223; see Col. 20; Ln. 41-67 through Col. 21, Ln. 1-19; and see Col. 21, Ln. 29-67 through Col. 22, Ln. 1-6; and see Col. 22, Ln. 10-51). **Claims 1, 4, 7, 10, 12-14, 17, 23, and 27-33** are subsequently rejected.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Routley et al. (US 2006 / 0001613) discloses a display driver circuit using constant current generators.

Smith et al. (US 7,239,309) discloses a display driver circuit using a reference current generator.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Mandeville whose telephone number is 571-270-3136. The examiner can normally be reached on Monday through Friday 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexander Eisen can be reached on 571-272-7687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason Mandeville
Examiner
17 December 2007

JMM

ALEXANDER EISEN
SUPERVISORY PATENT EXAMINER